Conversion Table

Area
1 acre = 43,560 ft²
1 ft² = 144 in²

Flow
1 MGD = 694.5 gpm
1 MGD = 1.55 ft³/s

Power
1hp = 0.746 kw

Pressure
1 psi = 2.31 ft (of water)
1 foot water = 0.433 psi

Time
1 Day = 1,440 minutes

Volume
1 ft³ = 7.48 gallons
1 yd³ = 27 ft³

Weight
1 gal water = 8.34 pounds
1 ft³ = 62.4 pounds
1 ton = 2,000 pounds

Concentrations and Solutions
1 ppm = 1mg/L
1% solution = 10,000 mg/L

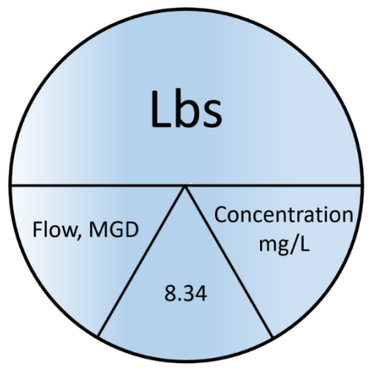
Shape	Area (ft²)	Volume (ft³)
Circle	$0.785 \times d \times d$	n/a
Cylinder	n/a	$0.785 \times d \times d \times height$
Rectangle	$length \times width$	$length \times width \times height$
Circumference	$\pi \times diameter$ $\pi = 3.14$	d = diameter

Basic Formulas - Ponds

$$Population\ Loading, Person/Acre = \frac{Population\ Served, Persons}{Pond\ Surface\ Area, Acres}$$

$$Organic\ Loading, Lbs, BOD/Day/Acre = \frac{(Flow, MGD) \times BOD, mg/l \times 8.34}{Area, Acres}$$

The Pounds Formula



Wastewater Treatment Basic Formulas

$$Pounds\ of\ BOD\ or\ TSS = flow, MGD \times 8.34 \times Concentration, mg/L$$

$$BOD, mg/L = \frac{(initial\ DO - final\ DO) \times BOD\ bottle\ vol, ml}{sample, ml}$$

$$Percent\ removal = \frac{influent - effluent}{influent} \times 100$$

$$F/M\ Ratio = \frac{Flow, MGD \times 8.34 \times BOD, mg/L}{vol\ of\ Aeration\ Tank, MG \times 8.34 \times MLVSS,\ mg/L}$$

$$Weir\ overflow\ rate, gpd/ft = \frac{flow, gpd}{length\ of\ weir, ft}$$

$$Hydraulic\ or\ surface\ loading, gpd/ft2 = \frac{flow, gpd}{surface\ area, ft2}$$

$$Detention\ Time\ (Days) = \frac{vol, mg}{flow, MGD}$$

$$Detention\ Time\ (Hrs) = \frac{tank\ vol, ft3 \times 7.48\ gal/ft3 \times 24\ hrs/day}{flow, gpd}$$

$$Sludge\ age, days = \frac{lbs\ MLSS\ in\ aeration\ basin}{lbs/day\ TSS\ in\ influent}$$

$$MCRT, days = \frac{lbs, MLSS\ in\ secondary\ system}{lbs/day\ SS\ wasted + lbs/day\ SS\ in\ effluent}$$

$$Organic\ loading, Activated\ Sludge = \frac{flow, MGD \times 8.34 \times BOD\ mg/L}{Vol\ in\ Aeration\ Tank,\ 1{,}000\ ft3}$$

$$Organic\ loading, Tr.Filter = \frac{flow, MGD \times 8.34 \times BOD\ mg/L}{Vol\ of\ filter\ media,\ 1{,}000 ft3}$$

$$Organic\ loading, RBC = \frac{soluable\ BOD, applied\ lbs/day}{surface\ area\ of\ media,\ 1{,}000\ ft2}$$

$$Oxygen\ Uptake\ Rate\ (OUR) = \frac{(DO1 - DO2)}{(Time\ 1 - Time\ 2)}\ x\ 60$$

(mg O_2/hr/g)

$$Specific\ Oxygen\ Uptake\ Rate\ (SOUR) = \frac{OUR}{MLVSS\ (conc.\ in\ mg\ per\ L)}\ x\ 1000$$

$$SOUR = \frac{DO\ drop\ per\ min.}{MLVSS(mg\ per\ L)}\ x\ 60\ x\ 1000$$

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Basic Formulas - Sludge and Solids

$$MLSS\ Suspended\ solids, mg/L = \frac{W2 - W1}{ml\ sample} \times 1{,}000 \times 1{,}000$$

$$MLVSS, mg/L = \frac{W2 - W3}{ml\ sample} \times 1{,}000 \times 1{,}000$$

W1 = Dish W2 = Dish & Dry Solids W3 = Dish & Ash

$$Sludge\ volume\ index\ (SVI), mg/L = \frac{SSV30, ml/L \times 1{,}000\ mg/g}{MLSS, mg/L}$$

$$Volatile\ solids, lbs = \frac{dry\ solids, lbs \times raw\ sludge, \%\ VS}{100\%}$$

$$Aerator\ solids, lbs = Tank\ vol, MG \times 8.34 \times MLSS, mg/L$$

$$Population\ equivalent\ (BOD) = \frac{flow, MGD \times 8.34 \times BOD, mg/L}{0.17\ lbs, BOD/Person/day}$$

$$Aerator\ loading, lbs/BOD, day = flow, MGD \times 8.34 \times BOD\ mg/L$$

$$Solids\ applied, lbs/day = (flow, MGD + RSF, MGD) \times 8.34 \times MLSS, mg/L$$

$$Solids\ loading, lbs/day/ft2 = \frac{solids\ applied, lbs/day}{surface\ area, ft2}$$

$$Percent\ reduction\ in\ volatile\ solids = \frac{in - out}{in - (in \times out)} \times 100$$

$$Dry\ solids, lbs = \frac{raw\ sludge, gal \times 8.34 \times raw\ sludge, \%}{100\%}$$

$$Return\ Sludge\ Rate, MGD = \frac{total\ flow, MGD \times settleable\ solids, \%}{100\%}$$

$$Digester\ loading, lbs/day/ft3 = \frac{VS\ added, lbs/day}{digester\ vol, ft3}$$

Pounds Formulas and Purity

$$lbs\ chemical = \frac{flow, MGD \times 8.34 \times\ ppm}{\%\ purity}$$

$$ppm = \frac{lbs\ chemical\ fed\ x\ \%\ purity}{MGD \times 8.34}$$